

# ***Anormalous liu* sp. nov.: a first record and a new species of the genus *Anormalous* Liu, 2011 (Orthoptera, Tettigoniidae, Phaneropterinae) from India**

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Academic editor: Tony Robillard | Received 20 September 2021 | Accepted 10 November 2021 | Published 16 December 2021

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<http://zoobank.org/55AA8EA9-43B6-4DCE-BDDC-D74B447292AB>

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**Citation:** Shah MS, Usmani MK (2021) *Anormalous liu* sp. nov.: a first record and a new species of the genus *Anormalous* Liu, 2011 (Orthoptera, Tettigoniidae, Phaneropterinae) from India. ZooKeys 1078: 49–55. <https://doi.org/10.3897/zookeys.1078.75499>

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## **Abstract**

The Phaneropterinae, commonly known as the bush katydids, are among the most diverse tettigoniids in the world. A new species *Anormalous liu* **sp. nov.** is described from Kashmir, India. This is the second species in the short-winged genus *Anormalous*. It is differentiated from the other species from China by the absence of posterior apical spurs on the fore and mid tibiae, the male subgenital plate with two long cylindrical lobes fused with each other and blunt at the apices, and the male stridulatory area longer than broad. We include a key to species in the genus *Anormalous*. The holotype has been deposited in the Museum of Zoology Department, Aligarh Muslim University, Aligarh Uttar Pradesh, India.

## **Keywords**

*Anormalous*, India, Kashmir, new species, Phaneropterinae

## **Introduction**

Katydid show an incredible diversity of forms and species (Heller et al. 2014), with many species reported from India. Some katydids sporadically become very obvious due to a sudden spurt in their population size due to weather

conditions (Rentz 2010). Important work on the taxonomy and distribution of the Tettigoniidae (including Phaneropterinae) of India include those of Barman and Srivastava (1976), Shishodia (2000), Barman (2003) and Shishodia et al. (2010). The Phaneropterine occupy a wide range of open habitats (Kocarek and Holusa 2006). Recently, Nagar et al. (2014, 2015) and Farooqi et al. (2021) reported new species of Phaneropterinae from India.

The genus *Anormalous* most resembles the genera in the tribe Ducetiini in the lateral lobe of the pronotum, the tympanum structure, the fore tibiae, and the absence of styli in male subgenital plate, but differs by the particular tegminal structure (Liu 2011). The genus was established for the species *Anormalous zhangii* Liu, 2011 from southern China, with only male specimen reported. The new species described herein can be assigned to the genus *Anormalous* based on similarities of the tegminal structure, but differs in various morphological characters described below.

## Materials and methods

During a field survey conducted in 2021 at different places in the Kashmir region, the specimens were collected by handpicking or with the help of sweep nets. Out of all collected samples, one male, and three females of the new species were found. They were preserved in alcohol and brought to the laboratory for identification. The specimens were examined under a stereo zoom binocular microscope. Genitalia were observed after cleaning with KOH. Photographic images were done using a DSLR camera with macro-lens. All body parts were measured using a vernier caliper. Both the holotype and paratype have been deposited in the Museum of Zoology Department, Aligarh Muslim University, Aligarh Uttar Pradesh, India.

## Results and discussion

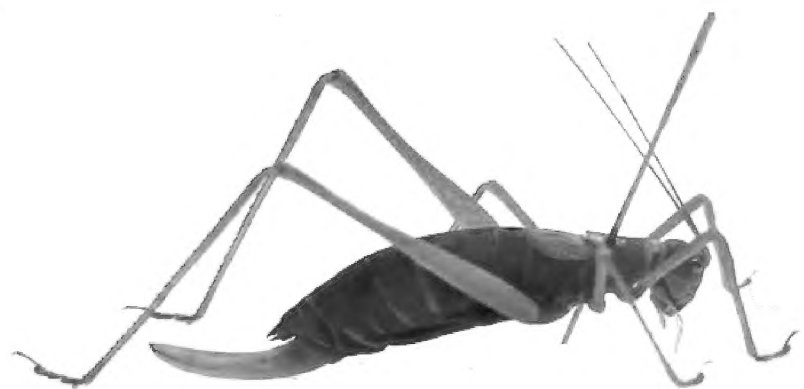
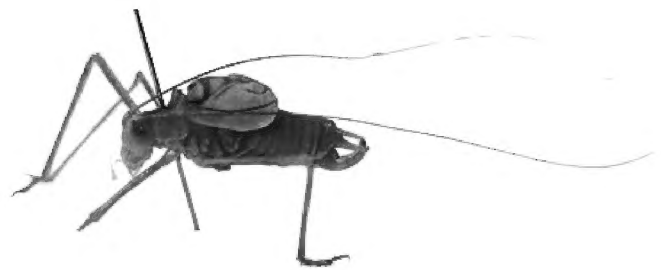
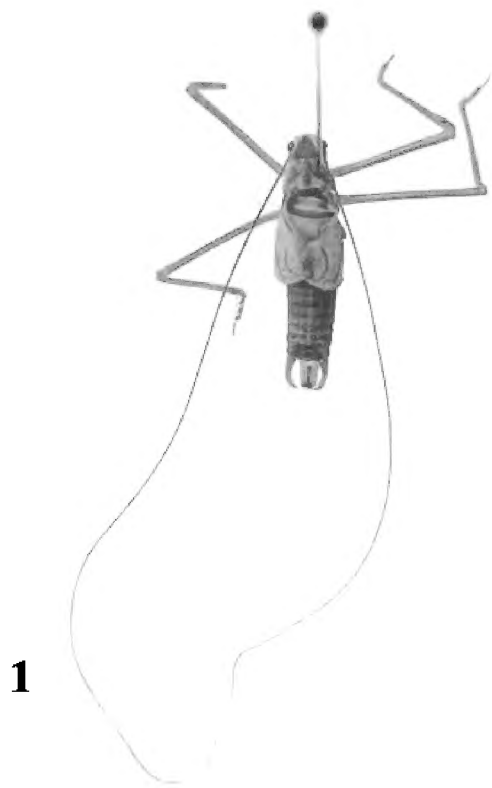
### *Anormalou* Liu, 2011

**Description.** Small sized body (Figs 1–4), light green, head more or less oval in shape (Fig. 5), fastigium dorsally sulcate with conical apex, narrower than first antennal segment (Fig. 8). Lateral lobe of pronotum distinctly longer than high (Fig. 6). Pronotal disc with prozona smooth and metazona flat, without lateral carinae (Fig. 7). Lateral lobe of pronotum with shallow humeral sinus. Eyes large and bulging outwards, antenna long (Figs 1–4), male subgenital plate elongate, notch at apical margin present or absent, devoid of distinct styli (Fig. 10), female tegmen comparatively shorter than male's with visible longitudinal veins (Figs 3, 4), last abdominal tergite rounded (Fig. 16), and ovipositor weakly curved (Fig. 18).

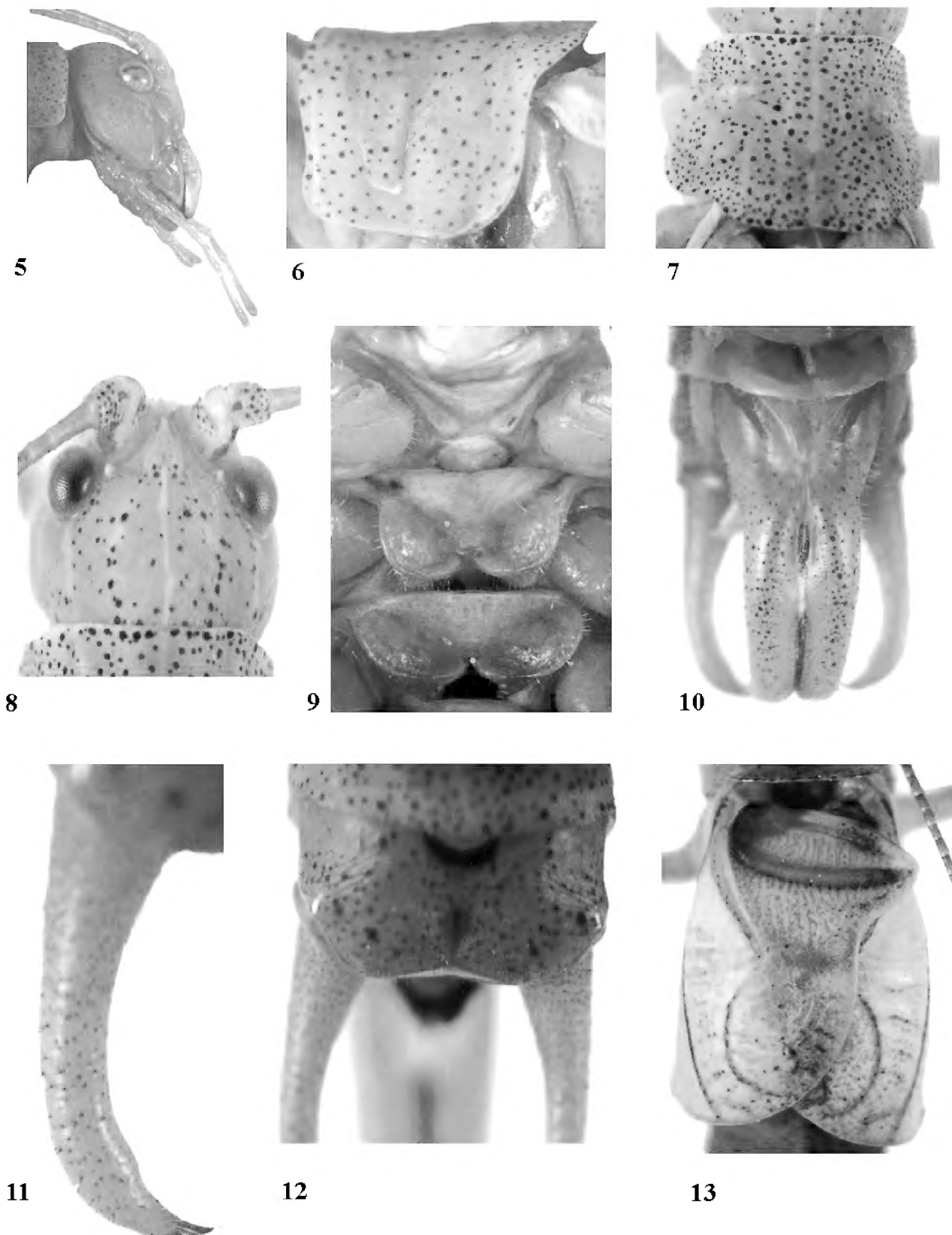
**Distribution.** China and India (Kashmir)

Key to species of the genus *Anormalous* (males only)

- 1      Posterior apical spurs on fore and mid tibiae present, male subgenital plate elongate, split from basal third into two triangular lobes, notch narrow triangular, lateral margin of lateral lobe tapering towards apices, male stridulatory area broader than long ..... *Anormalous zhangii* Liu, 2011
- Posterior apical spurs on fore and mid tibiae absent, male subgenital plate with two long cylindrical lobes fused with each other, blunt at the apices (Fig 10), with a small notch at anterior portion, male stridulatory area longer than broad (Fig 13) ..... *Anormalous liu* sp. nov.



**Figures 1–4.** *Anormalous liu* sp. nov. **1–2** Holotype male and **2–3** paratype female.



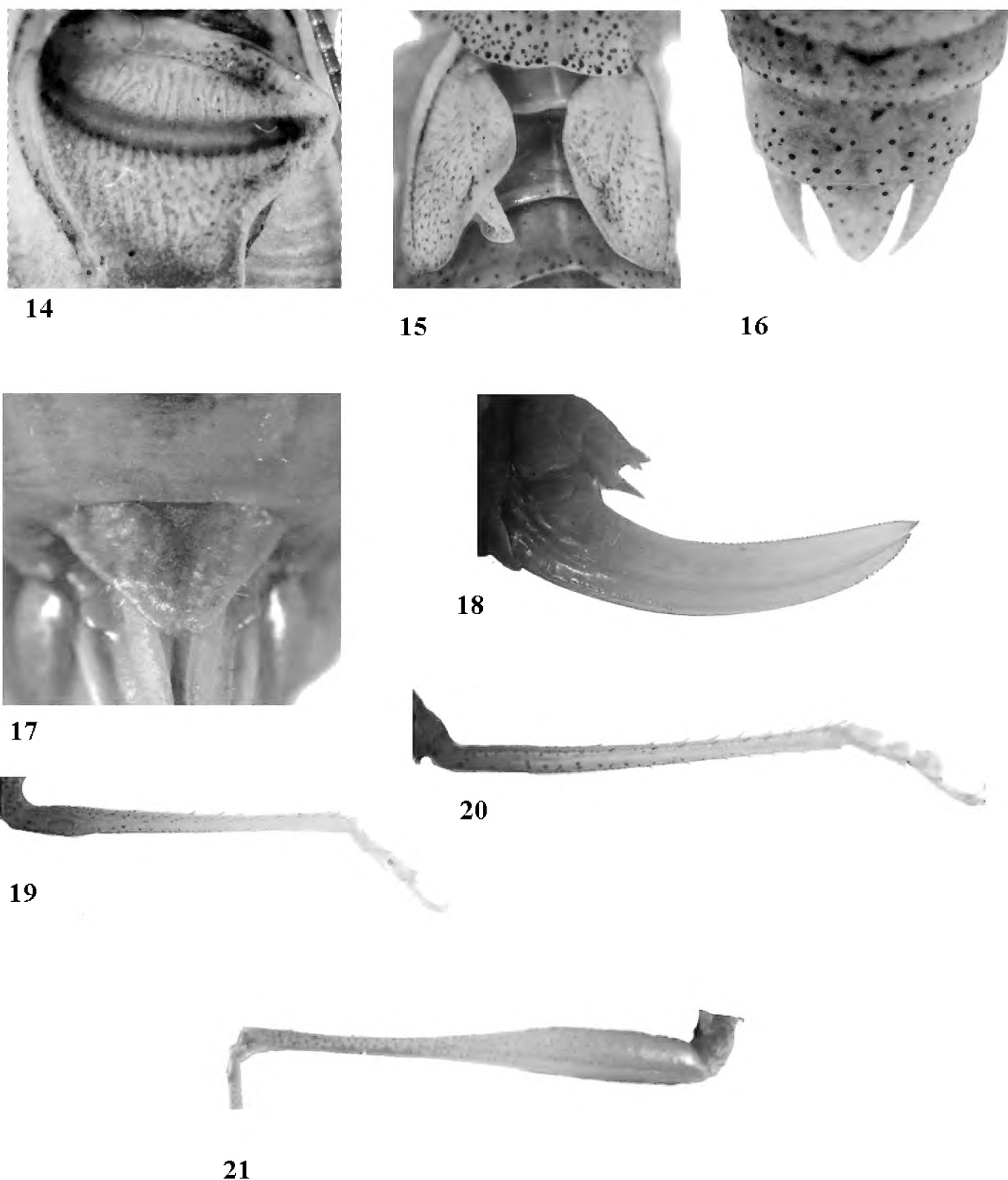
**Figures 5–13.** Characters of the holotype male *Anormalous liu* sp. nov. **5** head lateral **6** lateral view of pronotum **7** dorsal view of pronotum **8** fastigium **9** sternum **10** subgenital plate **11** cerci **12** male last tergite **13** tegmen.

***Anormalous liu* sp. nov**

<http://zoobank.org/49E3B7CD-3911-4E83-9D04-133C29361A30>

Figures 1–21

**Description. Male:** Small sized body, eyes large and bulging outwards, antenna long and flexible, light green, fastigium dorsally sulcate with conical apex, narrower than first antennal segment. Pronotum saddle shaped; lateral lobe of pronotum distinctly



**Figures 14–21.** *Anormalous liu* sp. nov. **14** male stridulatory file **15** female tegmen **16** female last tergite **17** female subgenital plate **18** ovipositor **19** fore tibia **20** mid tibia **21** hind femur.

longer than high. Pronotal disc with prozona smooth and metazona flat, without lateral carinae. Lateral lobe of pronotum with shallow humeral sinus. Tegmen short not surpassing the abdomen with longitudinal veins well developed, apex rounded; hind wings not well developed and shorter than tegmen. Fore tibia with two rows of 9 evenly- distributed spines ventrally; mid tibia with 12 spines ventrally and 6 dorsally; prosternum unarmed; mesosternum and metasternum with two more or less rounded lobes. Male last abdominal tergite rounded with a shallow depression; cerci long and cylindrical with pointed apex. Male subgenital plate elongated with two long lobes attached together; small notch at anterior end; apical end without distinct styli.

**Female:** Last abdominal tergite rounded without any incision; subgenital plate small, conical; epiproct long and tongue-shaped; cerci small, slender tapering toward the end; ovipositor long and weakly curved, with small teeth at distal end.

**Remarks.** The new species differs from the only other species, *Anormalous zhangi* Liu (2011), as follows: male subgenital plate with two long cylindrical lobes fused with each other, blunt at the apices (Fig. 10), male stridulatory area longer than broad (Fig. 13), and absence of posterior apical spurs on fore and mid tibiae.

**Distribution.** India, Kashmir

**Etymology.** The name of the species is given after Chun-Xiang Liu who described the genus *Anormalous*.

**Material examined. Holotype: Male.** India: Jammu and Kashmir; Kashmir, Kupwara, (34.5262°N, 74.2546°E), 01 male, 16.08.2021, on grass, collected by Muzamil Syed Shah deposited in Museum of Zoology Department, Aligarh Muslim University, Aligarh Uttar Pradesh, India.

**Paratype: Female:** India: Jammu and Kashmir; Kashmir, Baramulla, Gulmarg (34.0484°N, 74.3805°E), two females, 20.08.2021, on grass, collected by Muzamil Syed Shah deposited in Museum of Zoology Department, Aligarh Muslim University, Aligarh Uttar Pradesh, India.

## Acknowledgements

The authors are very grateful to University Grants Commission (UGC), New Delhi India for providing financial assistance during the work. Thanks are also due to the Chairman, Department of Zoology, Aligarh Muslim University, for providing necessary instruments and facilities during the entire work.

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